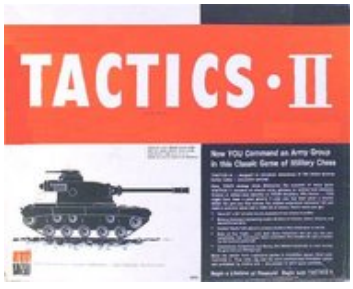
Does Game Technology Matter?

Forward to "Serious Game Design and Development: Technologies for Training and Learning"

By Roger Smith

Among the ruins of ancient Egypt there are multiple references to games that were popular among the Pharaohs. The remains and images of the game of Senet date back to 3,000BC. This board game contains features similar to modern checkers and a method of play reminiscent of a horse race around the board. Though primarily a game for entertainment, it was also used as a mystic tool to foretell the future. Egyptians believed that the square that a player's piece ended on contained special significance about what would happen to the person in the future. Though we would consider this superstition, the players at that time took the results as guidance on decisions about commerce, farming, religion, or family.

Around 1,400BC the game of Mancala emerged in Africa. It was a tool used to account for livestock and crops, and a form of entertainment. Tribesmen used the board and stones to negotiate the trade of goods, and perhaps to gamble for a better exchange. But they also passed the time in the fields playing a version of Mancala that had no economic consequences, but was purely a form of entertainment.



In 1956, Charles Roberts developed the components of the modern board wargame as a tool to help him prepare for his commissioning in the U.S. Army. But by 1958 he realized the commercial value of this wargame and created the Avalon Hill game company to market it to thousands of avid "armchair generals" who were eager to test and develop their own tactical military skills, but for entertainment. For the next four decades Avalon Hill and several competitors created wargames for both entertainment and military training.

Were these games primarily and initially entertainment or serious tools for guiding life decisions? There was really no hard division between the two purposes. There is no law of nature that says tools for education and training cannot be enjoyable to use, or that such tools cannot be inspired by or created from applications that were initially entertainment. The dual nature of games has been with us for at least 5,000 years. Today we may have replaced dice made from sheep knucklebones for computerized, pseudo-random number generation algorithms, but we continue to look to the results of game play for insight into important problems in our lives. Now we place our faith in the accuracy of

mathematical and logical algorithms rather than the mystical forces influencing the roll of the die, but we continue to construct games that can challenge our thinking and guide us to a better understanding of the world.

What is a Game?

What makes some activities and tools into games, while others are considered completely serious tools? In his 1970 book entitled *Serious Games*, Clark Abt defined a game with these words, “reduced to its formal essence, a game is an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context. A more conventional definition would say that a game is a context with rules among adversaries trying to win objectives.” In a 2005 issue of *IEEE Computer*, Mike Zyda defined a game as, “a physical or mental contest, played according to specific rules, with the goal of amusing or rewarding the participant.” He went on to suggest that a serious game was, “a mental contest, played with a computer in accordance with specific rules that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives.” Zyda explicitly points to the desirable goal of using “entertainment” to further the goals of the organization, to harness entertainment, fun, engagement, challenge, and trail-and-error to get people to learn more or to learn faster.

Academics like Andrew Hargadon at University of Southern California explore the difficulties involved in adopting tools and practices from other industries. There is a psychological, social, and professional barrier that keeps people from accepting ideas that were “not invented here.” The barrier between “serious business” and “frivolous entertainment” is even higher, wider, and deeper than those between industrial professions. Industries may adopt new computers, networks, materials, and energy sources. But reaching into the entertainment industry for something that can improve effectiveness is considered quite a daring and questionable move.

Game Technology

Games have created and introduced new technologies for centuries. Ancient games offered numbered throwing sticks, the predecessors to dice and random number generators, as a means of making decisions with limited information. Board wargames of the 1950’s introduced the hexagonal tessellation of terrain, a concept that is still used in cellular communications models as an approximation to the circular area covered by a tower. Charles Roberts introduced the combat results table as a means of enriching the military results from the throw of a die. Today all military models use extensive algorithms to make decisions, but often retain a random number generator as a nondeterministic influence in those algorithms.

Currently it is difficult to determine whether computer hardware and software technologies are “game technologies” or “serious technologies”. Graphics cards, network cards, and multi-core chips are all essential for the play of the latest computer games. But should they be tagged as serious or entertainment technologies? Does it matter? Does it help?

Recently the gaming industry has been the source of some of the best software technologies on the market. The 3D scene generators or game engines are far superior in performance and features to competing applications created in serious industries and academia. Game companies have adopted the principles of man-machine interfaces and effective graphical user interfaces to create complex applications for which no user's manual is required. But similar interfaces in serious industries can be so complex that multi-day courses are required to learn to use them. Games have isolated the most essential physics and human behavior features such that they can be incorporated into an application that can run on a consumer PC. They are certainly not the highest fidelity models of physics or artificial intelligence, but they are the most accessible and among most useful. Multiplayer games have advanced networking protocols and libraries so that players can join the virtual world from anyplace on the planet. But what serious industry applications provide this type of ad hoc collaboration?

The financial incentives and the personal energy that drive the creation of new technologies in the game industry have led to technologies that are just too valuable to be excluded from other serious industrial applications. All industries have got to take these technologies seriously or risk being passed by competitors who will use them.

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Game technologies have been adopted for military training, medical education, emergency management, city planning, spacecraft engineering, architectural design, religious proselyzation, political communication, movie making, and advertising – to name a few. These are far from being the dominant applications in any of these fields. But they gain ground every year as young game players become serious business people and as older business people become more avid game players. The barriers are falling. Each year more people are able to peer through the science fiction veneer of a space game and see the powerful computer science beneath. They understand the advantages of putting this technology to use, and doing so before a competitor does the same. In his 2003 *Harvard Business Review* article entitled "IT Doesn't Matter", Nicholas Carr shook up the business and the IT worlds with his observation that IT initially provided a competitive advantage. But after mass adoption, all industries had harnessed its power, and IT became as essential to modern business as electricity had been to the industrial revolution. It had transcended its own uniqueness and become essential. If game technology is as successful, it will lose its niche status to become an essential part of running an effective and profitable business.

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